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ABSTRACT

A theoretical framework is presented to investigate the interactions of certain motivational factors with test-wiseness. Test performance is a function of two independent elements: the cognitive learning in the classroom situation and the test-wiseness in the testing situation. These situations are associated with independent sets of affective characteristics. The Form Z Test of Test-Wiseness and the School Attitude Measure were administered to 216 students from 5 senior high schools. The results indicated that values and self-concept are related to test-wiseness; locus of control is not related to test-wiseness; and the relationships vary across different students. (PN)

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MOTIVATION AND TEST-WISENESS INTERACTIONS

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Paper Presented At The Annual Meeting Of The
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Summary

The purpose of this study was to investigate the relationships between motivating attitudes and test-wiseness. The results indicated that values and self-concept are related to test-wiseness, locus of control is not related to test-wiseness, and the relationships vary across different students.

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Standardized tests are increasingly becoming important features of American education. Schools use tests to support admissions and placement decisions, for evaluation of individual and group achievement, for psychological and mental evaluation, and as a basis for vocational guidance.

One recent study found that thirty-one states have minimum competency testing programs ("Minimum competency testing study," 1980). These tests are being used for certification of basic skills mastery prior to high school graduation, promotion from one grade to the next, identification of students in need of remediation, and assessment of curriculum needs.

In evaluating the results of standardized tests, decision makers generally assume that test scores are measures of the skills named by the test makers. However, as Anastasi (1981) noted, the test performance of an individual is only a sample of that person's learning or potential. In addition to those cognitive abilities or skills that a test is designed to measure, a student's score is also dependent upon the ability to demonstrate those abilities or skills within the test situation (Sabers, 1975).

As standardized objective tests became popular in the 1920's, researchers began to notice that different test-taking strategies could result in different scores for the same examinee. Such a phenomenon is counterintuitive since a given student would be expected to attain the same score on a re-administration of a valid and reliable test as long as content mastery was held constant. In particular, early literature verified the wisdom of changing answers after initial choices were made if the student had second thoughts about the question (Lehman, 1928; Lowe and Crawford, 1929; Mathews, 1929).

Test-wiseness, a construct encompassing the skills and strategies of taking tests, is widely recognized as a source of systematic error variance that can affect the reliability and validity of cognitive measuring instruments (Sarnaki, 1979). The seminal treatise on test-wiseness is recognized to be the report by Millman, Bishop, and Ebel (1965). They stated that test-wiseness "is logically independent of the examinee's knowledge of the subject for which the items are supposedly measures" (p. 707).

Several authors have described test-wiseness essentially as the ability to show what one knows. For example, Erickson (1972) stated that the test-wise student is one who "is able to understand the questions by which level of attainment is being assessed, as well as to utilize the most efficient approach available when answering these items" (p. 142). Similarly, Oakland (1972) defined test-wiseness as "the ability to manifest test-taking skills which utilize the characteristics and format of a test and/or test-taking situation in order to receive a score commensurate with the abilities being measured" (p. 355).

Other authors have allowed in the definition the ability to make it look like one knows even more than one really knows. Thorndike (1951), for instance, considered test-wiseness to be "the extent to which the individual is at home with tests and has a certain amount of sagacity with regard to tricks of taking them" (p. 569). In the most widely recognized definition, Millman et al. (1965) defined test-wiseness as the "subject's capacity to utilize the formats of the test and/or test taking situation to receive a high score" (p. 707). In other words, a test-wise student can use test characteristics to score higher even with little or no knowledge of the test content.

In response to test-wiseness, many schools have begun teaching test-taking skills to their students (Downey, 1977; Gifford and Fluitt, 1980). One large school system even requires its teachers to design their classroom tests in a format that will familiarize students with standardized testing situations (Aramburo, 1979).

Test-wiseness, however, is not the only issue in the controversy over test performance. Many educators speculate that poor performance on a test may result from lack of motivation to perform well. Furthermore, many of these educators believe that some students who are highly motivated in classroom learning situations may nevertheless be unmotivated in testing situations.

Motivation is a concept which contains facets of other affective characteristics. Five of these characteristics have been found to correlate highly with cognitive learning: anxiety, interests, locus of control, self-concept, and values (Anderson, 1981).

Anxiety is the emotional state of tension evoked by a perceived threat to personal security (Anderson, 1981). Atkinson (1964) equated anxiety with motivation to avoid failure. Research supports the belief that each person has an optimal level of anxiety for each task, and too little or too much anxiety may impede performance (Anderson, 1981).

Since tests are used to make social evaluations about students, tests can be perceived as threats to personal security. Thus tests can cause anxiety. Tryon (1980) summarized the research by noting that test-anxious people are more self-preoccupied and self-dissatisfied than are low test-anxious individuals. Worry and fear are generally believed to cause lower performance expectancy and lower achievement.

Interests are goals a person would pursue in the absence of coercion. Essentially, interests involve personal wants rather than either physiological needs or cultural norms. Interests motivate people to act in pursuit of their desires (Getzels, 1969).

In general, research supports the belief that interests might predispose a person to learn a particular content area rather than to pursue general goals such as academic achievement. Consequently, while interests can relate to content learning in the classroom, evidence is lacking that interests affect testing situations.

Locus of control is the assignment of responsibility for behavior or performance either to oneself or to an "external" force such as luck. Lefcourt (1976) theorized that the aversive quality of a stimulus is decreased when a person feels control over it. Locus of control is a motivational concept because people tend to seek situations where they accept responsibility for performance and to avoid situations where they attribute responsibility for outcomes to external forces.

A comprehensive review of the literature on locus of control was written by Stipek and Weisz (1981). They reported that locus of control is related to achievement, independent action, achievement motivation, concentration, effort, reflection, and tolerance of delay of reinforcement.

Eisenberg (1967) posited that internal locus of control determines the motivation a child has when confronting a test. Bauer (1977) summarized studies which indicated that locus of control is related to test performance and that external locus of control might increase test anxiety. Englehardt (1979) suggested that the relationship between test performance and locus of control is a result of the social evaluation attached to test performance.

Self-concept is a person's perception about personal worth and about how one is perceived by others. In general, an individual's self-concept emerges from social interaction (Kinch, 1963). Self-concept motivates individuals to behaviors that enhance their self-perception.

Self-concept in academics is dependent upon the interaction of actual student success and the accuracy of student perception of success (Vitale, 1980). Students with positive self-concepts tend to be more involved in learning and create fewer distractions in classrooms; thus self-concept is related to academic achievement (Anderson, 1980).

Students with good self-concepts answer more items on tests (Sherman, 1976). Eisenberg (1967) considered poor self-concept to be a major cause of poor performance on achievement tests. Bauer (1973) listed self-confidence as a factor contributing to the use of the test-taking skills of guessing strategies.

Values are beliefs a person holds about what is desirable, what is important, and what is personally or socially acceptable (Anderson, 1981). Values influence behavior by providing standards of what is worth expending energy to achieve (Getzels, 1969). Thus values motivate behavior.

Eisenberg (1967) claimed that a major reason lower-class children do not perform as well on standardized tests as do children from other classes is that lower-class children do not value the tests very highly. A low value might be attached to tests even when a high value is placed on learning. Eisenberg postulated that repeated failure and accompanying social evaluation cause a person to lower the value of test performance so as to preserve self-respect.

Bauer (1977) summarized research that indicated students perform better on tests when they believe that social prestige would be attached to high performance. Duell (1974) found that performance on test items improved as the perceived value of the material covered by those items increased.

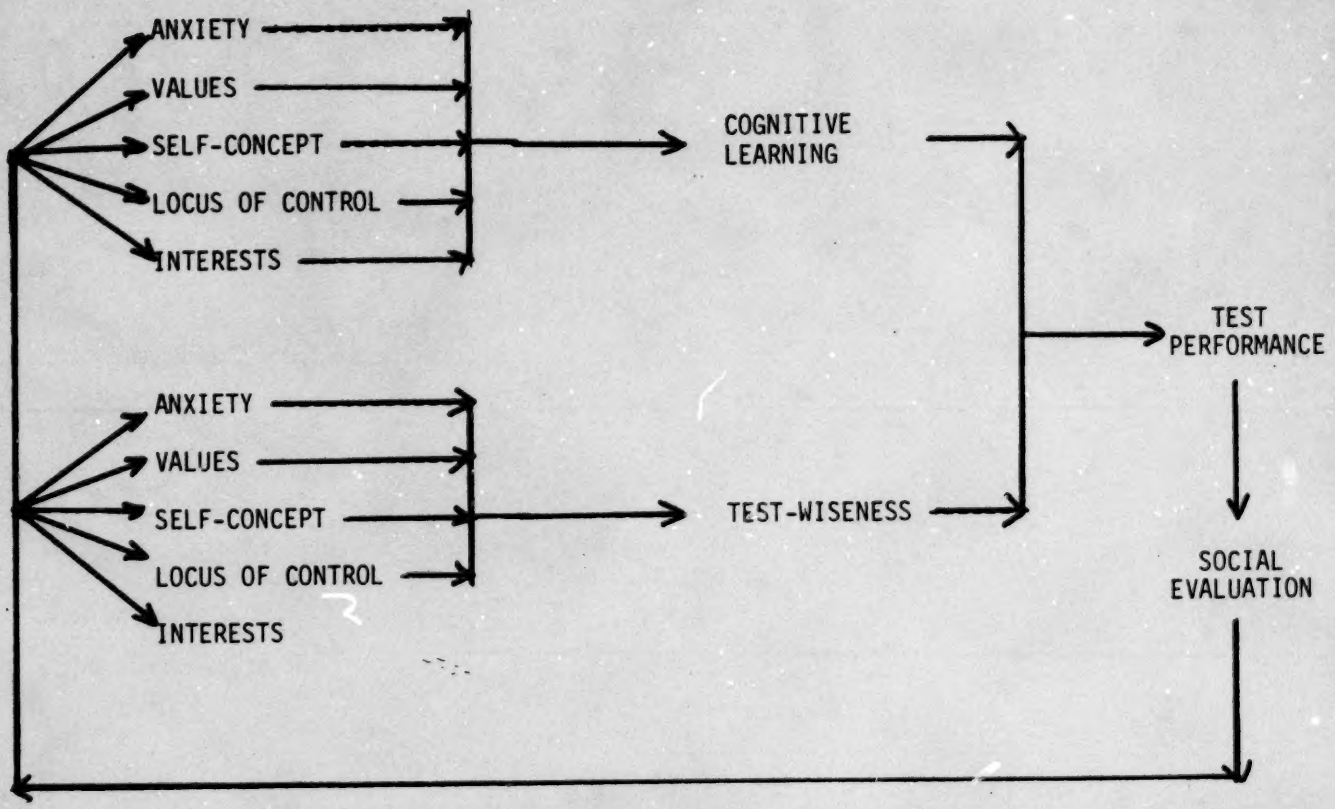
The purpose of this study was to investigate the interactions of certain motivational factors with test-wiseness. The theoretical framework (see Figure 1) shows test performance to be a function of two independent elements: the cognitive learning in the classroom situation and the test-wiseness in the testing situation. These situations are associated with independent sets of affective characteristics.

The motivating attitudes of anxiety, values, self-concept, locus of control, and interests interact in the classroom to influence cognitive learning. The anxiety, values, self-concept, and locus of control elicited by the testing situation predispose the student to use or not use test-wiseness skills to perform well.

The results of tests are used to make social evaluations about the student. These evaluations serve as feedback which then affect the degree and the direction of the future motivating forces evoked in the independent learning and testing situations. The consequence may be a cyclic pattern of success for the successful test-taker and of failure for the unsuccessful test-taker. The ultimate result may be a widening of the achievement gap between individuals.

The literature reports a relationship between anxiety and successful test performance. Evidence that interests might affect test performance is lacking. This study investigated the postulated interactions of values, self-concept, and locus of control with test-wiseness.

FIGURE 1: THEORETICAL FRAMEWORK



METHODOLOGY

Subjects

The subjects in this study were 216 students from five samples selected from senior high schools in the public school system of a large Southern city. Of this total, 211 students were seniors and 5 juniors; 148 were Black, 62 White, and 6 Asian; 93 were male and 123 were female. Eighty-seven students attended inner-city schools; 92 attended suburban schools, and 37 attended an alternative magnet school.

All subjects were selected from students enrolled in a course entitled Free Enterprise. This twelfth-grade course was chosen because it is required for graduation; thus classes were more likely to include all types of students. The course's content is also fairly unique, and so performance could be presumed to be less affected by prior achievement.

School 1 was an inner-city high school serving approximately 1600 Black students. Of the students, 61% received free lunch and 21% received Aid to Dependent Children benefits. Mean reading achievement levels were in the third stanine. This sample consisted of 15 male and 13 female students.

School 2 was an inner-city high school serving approximately 1100 Black students. Of the students, 80% received free lunch and 16% received Aid to Dependent Children benefits. Mean reading achievement levels were in the third stanine. This sample consisted of 26 male and 34 female students.

School 3 was a suburban high school serving approximately 950 Black, 800 White, and 100 Asian students. Mean reading achievement levels were in the fifth stanine. This sample consisted of 16 Black, 33 White, and 2 Asian students including 22 male and 29 female students. Economic data on the student population was not available.

School 4 was a suburban high school serving approximately 1250 Black, 1000 White, and 250 Asian students. Of the students, 15% received Aid to Dependent Children benefits. Mean reading achievement levels were in the fourth stanine. This sample consisted of 16 Black, 22 White, and 4 Asian students including 13 male and 29 female students.

School 5 was an alternative magnet high school serving approximately 180 Blacks, 100 White, and 20 Asian/Hispanic students from all sections of the city. The curriculum was college preparatory; students were selected for enrollment on the basis of achievement scores, grade-point average, attendance, and interviews. Mean reading achievement scores were in the sixth stanine. Of the students, 56% received free lunch and 5% received Aid to Dependent Children benefits. This sample consisted of 28 Black and 9 White students, including 17 male and 20 female students.

Instrumentation

Two instruments were used in this study: the Form Z Test of Test-Wiseness (Form Z) and the School Attitude Measure (SAM).

Form Z was developed by Ferrell (1972). The 46 test items measure the following test-wiseness principles outlined by Millman et.al. (1965):

1. Deductive reasoning strategies: elimination of incorrect options, strategies calling for multiple answers or eliminations, and using information from other items.

2. Cue using strategies: longer or shorter options, finer qualification or higher degree of generalization, grammatical consistency, specific determiners, and similarities between stem and choices.

Ferrell (1972) found a KR-20 reliability of .79 for this multiple-choice test when given to 110 eleventh graders. Millikin (1975) found a reliability of .84 when testing 306 eleventh graders. Stenning (1979) found a reliability of only .66 for Form Z; however, the study involved a somewhat atypical sample of hearing-impaired students.

The SAM (Dolan and Enos, 1980) was used to evaluate the three affective characteristics considered in the study.

Values were measured by the SAM Motivation for Schooling subscale. This subscale has a reliability of .88 (Dolan and Enos, 1980) and measures reactions to past school experiences and student motivation to learn, value placed on schooling, and perceptions of how significant others value schooling.

Self-concept was measured by the SAM Academic Self-Concept (Performance Based) subscale and the SAM Academic Self-Concept (Reference Based) subscale. The first scale has a reliability of .81 (Dolan and Enos, 1980) and measures student confidence in personal academic abilities and feelings about school performance. The second measure has a reliability of .80 (Dolan and Enos, 1980) and measures how the student thinks other people feel about the student's performance and ability to succeed academically.

Locus of control was measured by the SAM Sense of Control over Performance subscale. This subscale has a reliability of .81 (Dolan and Enos, 1980) and measures the extent to which the student feels the ability to exercise control over school situations and to take responsibility for the outcomes of relevant school events.

Each scale contains twenty items. Subjects respond using four-point Likert scales (never agree, sometimes agree, usually agree, always agree). Items were phrased and arranged to avoid response sets, independent responses, or mechanical selection. Rasch item-analysis techniques were employed in test development.

A weighted score is calculated from the total of the weighted scores from each item. The item responses were scored from 1 to 4 with a "4" meaning "always agree" on a positively stated item or "never agree" on a negatively phrased statement. Percentiles, stanines, and normal curve equivalent (NCE) scores are available based on a standardized national sample in 1979-1980.

Procedures

THe purpose of this study was to test the relationships between SAM subscale scores and Form Z scores.

Five principals representing inner-city, suburban, or alternative schools were approached and requested to participate. All five agreed and identified the two Free Enterprise classes from their respective schools that could most easily be scheduled for testing within the school program. Principals were directed not to select honors or independent classes. They were requested to select only regular classes with heterogeneous grouping.

In order to simulate the conditions typical of standardized testing in these schools, all testing was conducted during the morning hours, in the regular classrooms, and spread over a two-day period. All five samples were tested within the two-week period between quarter examinations and report cards so that feelings related to achievement could be presumed to be at their highest levels.

Prior to testing, all students were given a letter explaining that the study would explore reasons why some students do not perform as well on tests as they can. Confidentiality was assured by a numerical coding system. Only one student opted out.

The researcher administered all tests. On the first day, students completed the School Attitude Measure. The next day, students took the Form Z Test of Test-Wiseness.

The results of the Form Z were subjected to latent trait analysis (Thompson and Barnitz, 1981). As a result, sample-free item calibrations and item-free person ability scores were obtained. The scores generated were equal interval.

The SAM subscale scores were converted to NCE scores (Tallmadge and Wood, 1976) in order to have equal interval data. Stepwise multiple regression was performed using the four SAM subscale scores as predictors and the latent person ability scores as the criterion variable. Statistical significance of the B-weights was tested using 95% confidence intervals.

The invariance of the regression equations was tested across samples (Thompson, 1981) in order to determine empirically whether the weights reflected capitalization on sampling error. Two methods were employed. In the first method, the total sample was randomly split into two subsamples (Subsets A and B). In the second method, the total sample was split into the five samples from the different types of schools.

In both methods, the following procedure was followed. Each sample was paired with each other sample. A prediction of the test-wiseness ability of each student in the given sample was made from that sample's regression equation. Another prediction of the ability was made for the given sample using instead the regression equation of another sample. Pearson correlation coefficients were then calculated between the two sets of predicted values.

RESULTS

The descriptive statistics for Form Z and SAM are listed in Table 1.

Insert Table 1 about here

The variables reported are latent test-wiseness ability (TWABLY) from FORM Z, Motivation for Sch ling (MOTIV), Academic Self-Concept: Reference Based (SCRB), Academic Self-Concept: Performance Based (SCPB), and Sense of Control over Performance (CNTRL). Form Z was found to have a KR-20 reliability of .82.

The correlation coefficients for the total sample are presented in Table 2.

Insert Table 2 about here

Significant correlations were found between test-wiseness (TWABLY) and the affective measures of values (MOTIV) and self-concept (SCRB and SCPB). Locus of control (CNTRL) was not found to be related significantly to test-wiseness. The four attitude measures were found to be significantly interrelated.

The weights for the regression equation for total sample and random subsets are listed in Table 3.

Insert Table 3 about here

The values measure (MOTIV) and one of the self-concept measures (SCRB) were the only weights found to be significant. For the random subsets, Subset A had a significant weight for SCRB alone. Subset B had a significant weight for MOTIV alone.

Weights for the samples from each school are presented in Table 4. Significant weights were found for the equations in School 3 (SCRB), School 4 (SCRB), and School 5 (MOTIV).

Insert Table 4 about here

The invariance coefficients between the random samples (Subsets A and B) were .86 and .88. The samples from the inner-city schools had invariance coefficients of .69 and .81. The coefficients from the suburban samples were .97 and .92. Other invariance coefficients between pairs of samples were lower than these.

DISCUSSION

The results of this study indicated support for the hypothesis that academic values and academic self-concept were related to successful application of test-wiseness skills. No support was found for a relationship with locus of control.

The relationships found varied across samples. However, these relationships were found to be somewhat stable across random and inner-city samples and very stable across suburban samples. This phenomenon suggests that while attitudes are apparently related to test-wiseness, the manner in which these factors relate may vary across different children. One explanation might be that suburban, inner-city, and "magnet" children have different experiences with the social evaluation attached to test performance.

The data suggest that academic values (MOTIV) are negatively correlated with test-wiseness. This result is in opposition to much of the advice given teachers regarding motivational strategies for testing. In other words, it may be that students who value test performance very highly become too anxious or otherwise handicapped when confronted with difficult test items. One possible conclusion is that a student needs a healthy balance between academic values and self-concept in order to perform at an optimal level on a test.

Table 1: Descriptive Statistics

Sample	n	mean	s.d.
Total	216		
TWABLY		-.18	.78
MOTIV		60.02	20.37
SCRB		61.75	19.12
SCPB		61.61	19.86
CNTRL		61.21	18.84
School 1	28		
TWABLY		-.70	.41
MOTIV		60.93	18.78
SCRB		70.50	13.87
SCPB		63.86	17.47
CNTRL		67.00	17.84
School 2	59		
TWABLY		-.56	.63
MOTIV		68.97	18.07
SCRB		61.27	17.96
SCPB		62.64	19.21
CNTRL		62.29	18.53
School 3	50		
TWABLY		.19	.83
MOTIV		54.74	21.64
SCRB		55.36	20.54
SCPB		57.12	23.36
CNTRL		54.68	17.99
School 4	42		
TWABLY		-.27	.72
MOTIV		51.95	18.93
SCRB		59.19	17.50
SCPB		60.00	16.02
CNTRL		57.71	19.27
School 5	37		
TWABLY		.43	.58
MOTIV		61.35	19.86
SCRB		67.41	20.92
SCPB		66.14	20.93
CNTRL		67.92	17.80

Table 2: Correlation Matrix for Total Sample

	TWABLY	MOTIV	SCRB	SCPB	CNTRL
TWABLY					
MOTIV	-.154*				
SCRB	.210***	.399***			
SCPB	.133*	.562***	.748***		
CNTRL	.045	.594***	.599***	.565***	

* significant at p<.05
** significant at p<.01
*** significant at p<.001

Table 3: Weights for Sample Ignoring School Membership

Data Set	n	B	95% C.I.for B	BETA
Total	216			
MOTIV		-.013	(-.020,-.006)	-.343
SCRB		.009	(.001, .017)	.220
SCPB		.005	(-.003, .013)	.140
CNTRL		.002	(-.006, .010)	.038
A (constant)		-.378	- -	--
Subset A	112			
MOTIV		-.010	(-.021, .001)	-.235
SCRB		.014	(.001, .027)	.334
SCPB		.002	(-.011, .015)	.045
CNTRL		-.002	(-.013, .009)	-.037
A (constant)		-.456	- -	--
Subset B	104			
MOTIV		-.015	(-.024,-.006)	-.453
SCRB		.004	(-.007, .015)	.097
SCPB		.008	(-.003, .019)	.211
CNTRL		.006	(-.005, .017)	.140
A (constant)		-.372	- -	--

Table 4: Weights for Sample from Each School

Data Set	n	B	95% C.I. for B	BETA
School 1	28			
MOTIV		-.001	(-.014, .012)	-.040
SCRB		-.002	(-.019, .015)	-.079
SCPB		.004	(-.010, .018)	.169
CNTRL		.006	(-.007, .019)	.249
A (constant)		-.011	--	--
School 2	59			
MOTIV		-.006	(-.018, .006)	-.162
SCRB		.006	(-.006, .018)	.158
SCPB		.000	--	.000
CNTRL		.009	(-.003, .021)	.263
A (constant)		-.011	--	--
School 3	50			
MOTIV		-.005	(-.021, .011)	-.130
SCRB		.027	(.009, .045)	.675
SCPB		-.005	(-.023, .013)	-.148
CNTRL		-.007	(-.025, .011)	-.161
A (constant)		-.340	--	--
School 4	42			
MOTIV		-.010	(-.025, .005)	-.263
SCRB		.018	(.001, .036)	.446
SCPB		.003	(-.015, .021)	.061
CNTRL		-.006	(-.022, .010)	-.148
A (constant)		-.684	--	--
School 5	37			
MOTIV		-.019	(-.029,-.009)	-.647
SCRB		.004	(-.012, .020)	.140
SCPB		.008	(-.009, .025)	.273
CNTRL		-.001	(-.014, .012)	-.022
A (constant)		.879	--	--

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